Disaster waste management challenges

Disasters are brought about by various causes such as earthquakes, tsunamis, typhoons, volcanic eruptions, fire, terrorism, war, and negligence. Over the past decade, several major disasters have destroyed social infrastructure all over the world: the Sumatra–Andaman earthquake in 2004, Hurricane Katrina in 2005, the Great Sichuan Earthquake in 2008, and the earthquakes in New Zealand and Turkey in 2011.

The Great East Japan disaster started with a magnitude 9.0 earthquake offshore from the Sanriku region on 11 March 2011, the most severe ever observed in Japan, with at least 100,000 buildings totally or partially destroyed. Similar to the devastation in Japan, significant damage was caused to the city of Christchurch and the central Canterbury region when New Zealand was impacted with 6.3 magnitude earthquake in February 2011. Having the building structures weakened with the February 2011 earthquakes, a series of aftershocks of 5.3 and 6.3 magnitudes in June 2011 resulted with huge damage, reported as the third costliest earthquake in the world history. Massive flooding in late July 2011 onwards was the worst flood experience in Thailand in 50 years (http://en.wikipedia.org/wiki/2011_Thailand_floods). The damage has estimated to be more than US$45 billion, with a huge amount of debris generated.

Depending on a disaster’s causes, the types of industry in the locality, the density of buildings, and other such factors, there are considerable differences in the quality and geographical extent of the environmental and waste collection/disposal problems that arise. Waste management issues include the availability of disposal capacity, availability of treatment, recycling and reuse options, transportation of waste materials, accessibility to waste management facilities, environmental hazards, financial implications, labour availability, and legal and ethical responsibilities. All these and more aspects need to be considered by those responsible for planning and conducting clean-up and waste management strategies. As for the categories of waste generated from disaster events, the applicable strategies vary greatly. In other words, there are big differences in the nature of the environmental impacts and the types of waste resulting from individual disasters; thus, generalization is difficult.

The following is one of many conceivable classification schemes for the composition of disaster wastes from earthquakes and tsunamis: waste consumer electric appliances and electronics, and various household effects, waste wood, concrete rubble, tiles, etc.; plants, trees, and other natural items; large structures, etc.; deposits (silt, bottom sediment, etc.); wrecked vehicles and boats; hazardous wastes (asbestos, pesticides, polychlorinated biphenyls, radioactive materials, etc.); evacuation centre waste; and infectious waste (human corpses and animal carcasses). The waste management strategies consider how wastes could be recycled so that valuable resources can be reused and scarce landfill space conserved.

The 2004 tsunami in Sri Lanka reportedly produced approximately 0.6 million metric tons of waste. The disposals begun with open burning and were eventually stopped due to air pollution. Then, the practice changed to burying waste in existing dumpsites, coral mining areas, and even playgrounds. Thailand, on the other hand, had to deal with more than 0.9 million metric tons of disaster waste during and after the 2004 tsunami event incurring a total cost of approximately US$30 billion. Construction and demolition debris generated during and after the earthquake and tsunami in 2004 that hit Banda Aceh, Indonesia, required use of more than 725,000 m³ of land for disposal. In these and other areas, such as in Japan, lack of sufficient close-by land area suitable for debris disposal presents substantial challenges. Yet, benefiting lessons can be learned from these events.

A report released by the Japanese government estimated that the Great East Japan Earthquake generated approximately 28 million metric tons of disaster waste, which is equal to the total solid waste generated in one year by the local population (http://www.rcwet.t.u-tokyo.ac.jp/kurisu/gesis/report2.html). The amount is likely to exceed 44 million metric tons if tsunami sediment deposits are included. The contamination of the waste with radioactive emissions complicated the waste collection and disposal. Although some have criticized the slow response to disaster debris collection and disposal, it is apparent that clean-up following an earthquake and tsunami presents even greater challenges than those faced by crews responding to an earthquake alone, such as the Great Hanshin Earthquake situation. Although the damage from the Great Hanshin Earthquake was huge, collapsed houses and buildings, and other structures remained essentially in their original places; thus, the efforts of each property owner can be marshalled to help deal with his own clean-up and debris removal. On the contrary, in the Great East Japan Earthquake, it was only in rare cases that private property remained at its original location. Thus, it has been difficult if not impossible to even contact the rightful owners of debris to enlist their help in the clean-up. Additionally, Tohoku region has fewer established disposal sites compared to that of Kobe region where the largest disposal site in Japan was located.

A week after the Great East Japan Earthquake, the Japan Society of Material Cycles and Waste Management (JSMCWM),
launched the ‘Taskforce on Disaster Waste Management and Reconstruction’ project. The Taskforce includes people from various fields who spontaneously gathered to access and recommend options to tackle disaster waste management issues. The major purposes are to survey, in cooperation with local governments, the status of disaster waste in the affected areas, and to organize and compile the obtained results as systematic academic data. Practical efforts of the Taskforce so far include the following:
(a) working together with the local people to conduct a study on disaster waste in the affected areas; (b) announcing in collaboration with the Science Council of Japan an ‘Urgent Proposal on Measures for Disaster Waste and Prevention of Environmental Impact’; (c) publishing manuals on strategies for separating and treating disaster waste; (d) investigating the environmental effects of sediments deposited on land by the tsunami and publishing guidelines for dealing with them; and (e) conducting combustion testing of disaster waste that contains chlorine from sea salt. This information will be shared across the world.

The series of events produced several important challenges for disaster waste management which include the following activities.

1. Exchanging information on the relationship between the characteristics of each local disaster and the types and quantities of disaster waste generated; Waste Management & Research can play an important role in this information exchange.
2. Predicting the amounts and quality of disaster waste from the viewpoint of management systems.
3. Developing guidelines for each type of disaster, and regional plans for how to dispose of each type of waste.

Some countries have initiated disaster waste management programs to manage waste from war zones. (http://www.epa.gov/osw/constr/edm/debris.htm; http://www.dispines.com/wiki/Schur) whereas others are quite slow to follow suit. The stii selected by Japanese authorities to manage the disaster will serve as examples for virtually all other nations, all countries are prone to such disasters. The lessons learned from the recent spate of severe disasters throughout the world enable better preparations for facing such unpredictable events in the future, especially on waste management.

Waste Management & Research can play a pivotal role in the information dissemination and interaction of major players in disaster waste management by producing a number of issues dedicated to this topic, and it is the aim of Waste Management & Research so to do.

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